Chemical & Engineering NEWS

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THERMOPLASTICS

Recession puts growth far behind forecasts

A Key Polymers Review *Page 10*

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Cover: A 90-inch-diameter, four-story-high bubble of polypropylene film at Hercules' Terre Haute, Ind., plant

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Thermoplastics continue long market sag

Pause in growth is in third year for high- and low-density polyethylene, polyvinyl chloride, polypropylene, polystyrene

Bruce F. Greek
C&EN, Houston

Though possibly an illusion from a sour year, the whole concept of time seems to have changed for U.S. plastics. A year ago, producers knew that their recovery from the 1980 recession had run into a snag (C&EN, Aug. 31, 1981, page 13). Now, pounded by another recession, they are wondering if their old models of growth and investment will ever resume.

So this is an eerie as well as painful period. Plastics never have had anything like it. After only one down year ever (1975) in their incredible history of growth, the dominant thermoplastics—low-density and high-density polyethylene, polyvinyl chloride, polypropylene, and polystyrene—are facing in 1983 the fourth straight year in a pause that began in 1980.

Needless to say, most of the industry's timetables from the late 1970s are out the window. Production, sales, prices, profits, plant use rates, exports, and most market development are hopelessly behind. Only in technology, where vigorous work continues on lower-cost processes, has the former pace held up.

Adjustment to the grim reality of the early 1980s has been forced and dreadful. Real-market prices have plummeted, many plants are shut down for the moment or permanently, and much new investment has gone on the shelf.

Key Polymers

Instead of outracing the rest of the chemical industry, as plastics did decade after decade, the five largest-volume thermoplastics are magnifying the industry's problems. Most plastics data are worse than for the industry as a whole.

Here's the 1982 scoreboard. Odd though it may seem, the five plastics' combined production of 24.3 billion lb this year will be 9% below 1979 output after a 5% drop from 1981. Average real-market prices have slumped 16% in 1982 to 31 cents a lb from 37 cents in 1981. In 1981, prices eked out a 3% increase from 1980.

The double wallop from volume and prices has produced a stunning setback for plastics' value this year. After a combined production value of $8.7 billion in 1980 and $9.5 billion in 1981, the five leading thermoplastics' value will fall 20% to $7.6 billion in 1982. Compare this to an estimated 5% drop in 1982 sales for the basic chemical industry.

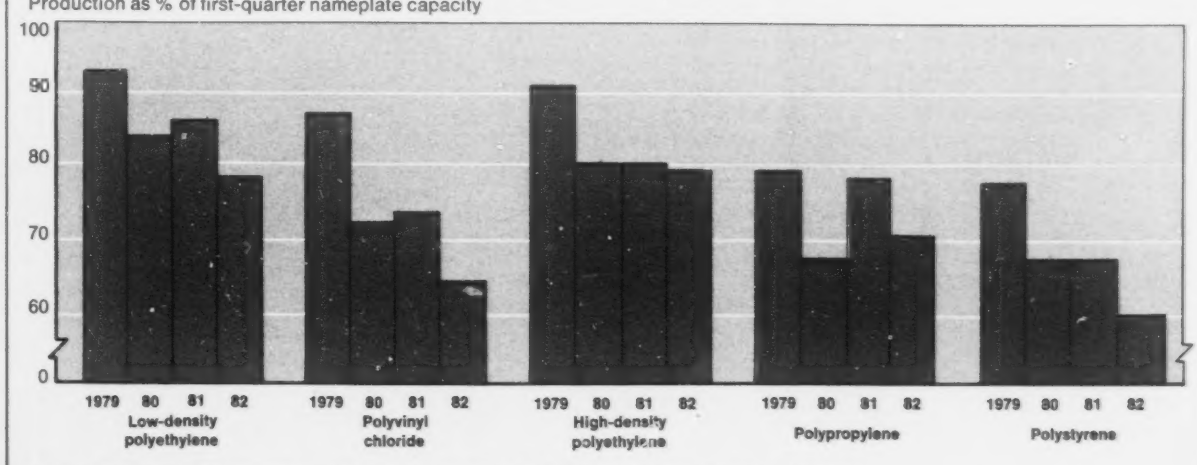
Unfortunately, although plastics markets sagged in 1982, plant capacity kept right on coming. Nameplate capacity in the first quarter was up 3% from 1981 to 34.2 billion lb. This total is up 11% from 1979.

The effect on capacity use levels is a foregone conclusion. Average capacity use rates for the five thermoplastics dropped from 86% in 1979 to 75% in 1980, 74% in 1981, and 71% this year.

This despite the beginnings of an inevitable capacity shakeout, now hitting low-density polyethylene, polyvinyl chloride, polypropylene, and polystyrene. In LDPE and PVC, shutdowns are being accelerated by a process-cost gap that has developed between newer and older plants. Vastly improved technology has created such a cost penalty for older plants that many more shutdowns are expected.

For the next year, hopes are growing for a good recovery. But

Plant use for five thermoplastics will drop across the board in 1982



Sources: Industry and C&EN estimates; Ernst & Whinney for the Society of Plastics Industry's Committee on Resin Statistics

plastics' financial outlook still is shadowed by some ominous clouds. Because of low plant use rates, prices still are under downward pressure from customers.

On the other side of the production process, the cost of raw materials, a bargain up until now, may start rising again. So analysts believe that overall profitability in plastics—what little that does exist—may suffer through the rest of this year and even in 1983.

Many feedstock costs for plastics are beginning to rise as a result of recent large increases in costs of light hydrocarbons from natural gas. For example, ethane, at least on a spot price basis, now costs 50% more than it did four to five months ago. Propane costs a third more. Hence, derivative ethylene, now ranging from 17 to 19 cents a lb, could soon tack on 2 or 3 cents. Later on, this all-important starting material for four of the five major thermoplastics could go up even more, perhaps another 2 to 3 cents, analysts predict. Could thermoplastics producers pass through these cost increases? Not now, industry sources say. So profitability could dip some more before climbing in 1983 or later.

Unhappily for producers, they rather quickly passed on raw material cost breaks from earlier this year to customers, exacerbating the big declines in sales dollars. For example, list prices for LDPE's large-volume grades now are about 10 cents a lb below prices after discounts a year ago. Of course, ethylene at 17 cents a lb this spring was 10 cents below its old price.

These cuts, along with below-forecast production, have led to large declines in the commercial value for thermoplastics in 1982 from 1981. For example, LDPE, heavily buffeted by price cuts, in part the result of linear polyethylene's reaching the market and carving out its segment, will have commercial value of $2.0 billion in 1982. This is down 31% from a downward revised $2.9 billion for 1981. Other thermoplastics will have lesser declines in their commercial value in 1982.

Even in the best of times, relatively little of thermoplastics' commercial value actually goes into producers' pockets as profit. Most of the selling price goes for raw materials, plant operating expenses, and cost of the plant investment. When competition gets tougher as in the past year, some cost components such as raw materials and plant operating expenses are cut through efficiency improvement programs to cover discounts from list prices. But there is a limit to this, so eventually all of the discounting comes from profits.

When commercial values decline for long periods, producers eventually are forced to decide whether to stay in business. Such decisions well may be under way at various thermoplastics producers, and odds are that the answer will be yes in many cases. Prime candidates are smaller, older units in polystyrene, polyvinyl chloride, and conventional low-density polyethylene.

Pressing demand problems will be the main cause of shutdowns in polystyrene and PVC over the next few years. For LDPE, however, the main impetus will be the technology shift to linear low-density material, which is made in plants not too unlike HDPE units. Low-pressure operations inherently are lower-cost operations. This makes all high-pressure process units suspect at today's energy costs.

Technology also is available to shift both conventional high-density plants and high-pressure, low-density plants over to low-pressure operations to make either linear low-density polyethylene or high-density polyethylene. Hence, the two traditional types of polyethylene are tending to blur on plant source. In the next few years, individual sources of high- or low-density polyethylene will be difficult to ascertain. Capacity reporting could change to combined polyethylene data, and eventually the density distinction could end, much as have property distinctions among other polymers.

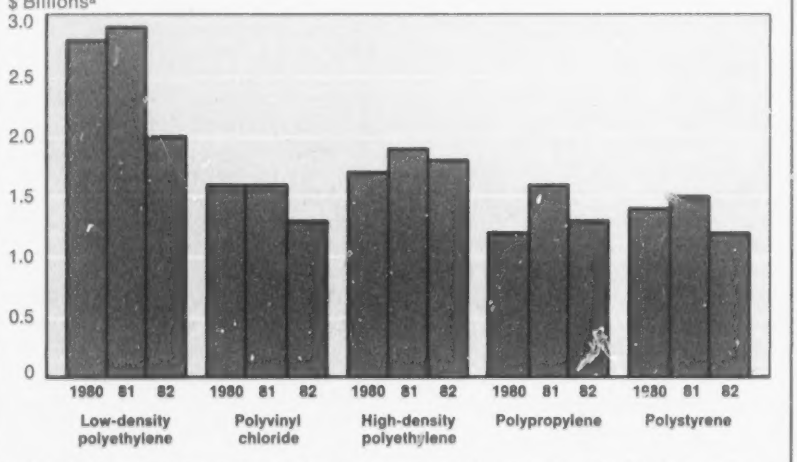
The changes in polyethylene production technology and product mix will take several years to complete. Some of those changes may be different from what is expected now as economics change. Financing those shifts won't be easy given expected profitability limits. But once the changes are made, some improvement in profitability is likely, even with slower growth rates expected for these major thermoplastics.

In the meantime, some curious flip-flops have occurred in value relationships among the thermoplastics themselves. These changes suggest changed competitive conditions in some markets. The most obvious is that polypropylene no longer is on the cheap end of the spectrum. It is the only one of the five whose real price has held up since 1980. In so doing, polypropylene is not far behind polystyrene and HDPE, which remain the most expensive. Polypropylene doesn't seem to have suffered so much as has polystrene, from its relatively high value. The polypropylene price remains high because raw material propylene prices have proved much stronger than ethylene prices and, in fact, have surpassed ethylene after many years on the light side.

The really inexpensive thermoplastics are LDPE and, especially, PVC. Both have had a price shock because of falling markets. The only saving is that raw material ethylene and chlorine have been extraordinarily cheap.

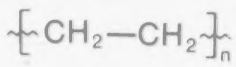
For details on the immediate 12-month outlook for the five thermoplastics, see the following pages.

Low-density polyethylene suffers the worst value drop



a Commercial value of total production. **Sources:** Industry and C&EN estimates; Ernst & Whinney for the Society of the Plastics Industry's Committee on Resin Statistics

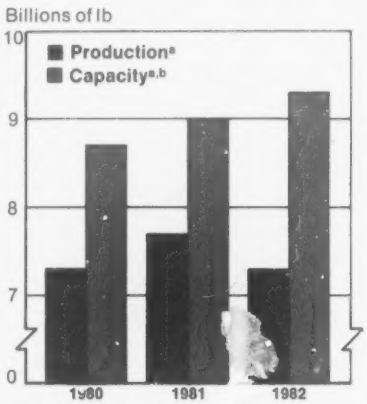
Key Polymers



Low-density polyethylene

- ***Demand down***
- ***Capacity still up***
- ***Price cuts deep***

PRODUCTION/CAPACITY



a Includes linear low-density polyethylene.
b First quarter.

HOW MADE

Polymerization of ethylene at high and low pressures aided by catalysts and initiators

MAJOR FABRICATED FORMS (U.S.)

Film, largely for packaging, 65%; injection molding 10%; coatings 10%

FOREIGN TRADE

Exports—may rise to 1.1 billion lb in 1982, imports—negligible

PRICES

Large-volume list prices way down, to 28 to 32 cents per lb; discounting still widespread

COMMERCIAL VALUE

$2 billion for production, 1982

A year ago, low-density polyethylene had the brightest fortune and certainly the most excitement among major thermoplastics. Its plant use and general recovery had kept up, and the dramatic technology shift to the linear low-density (low-pressure) product type promised another boom in new markets. Investment plans crowded the world production scene.

How things have changed! LDPE has had the most stunning financial reversal among thermoplastics in the intervening recession, and even the shift to the linear low-density product seems to have its problems. One result could be stepped-up closings of old plants or accelerated conversion of old capacity to new, low-pressure technology.

Even though linear LDPE is the current star of the thermoplastics business, its production will not much exceed 1 billion lb in 1982, or 15% of the LDPE total. Hence, as with many chemical and nonchemical products, the newest entry gets inordinate attention while earlier warhorses still carry the main load in production, sales, and profit.

Combined production of linear low-density product and conventional low-density polyethylene will be about 7.3 billion lb in 1982, down 5% from 1981. The 1982 output will about match that of 1980 and will be down 6% from the 1979 record of 7.8 billion lb.

Nameplate plant capacity for all kinds of low-density polyethylene was about 9.3 billion lb as the year opened. Since then, a number of switches have occurred. The largest decline was shutdown of Cities Service's plant at Lake Charles, La. Expansions have taken place exclusively in linear low-density capacity; these have more than offset the decline from shutdowns. Many of the expansions, however, have come well into the year, limiting actual production for 1982.

Estimates around the industry vary on capacity actually available for production this year. On balance, it likely will run about 9.7 billion lb. Some capacity will not run much during the year, and some shutdown capacity probably will never be restarted, even though no scrappage has been announced.

On the basis of an estimated average nameplate capacity of 9.7 billion lb this year and estimated production of 7.3 billion lb, the average operating rate for 1982 will be 75%. Production estimates for the year are within about 200 million lb of one another. This production uncertainty, plus the unusually choppy capacity picture, could change the final operating rate several percentage points.

By contrast, little change is due in the use pattern for low-density polyethylene in 1982. Exports of this plastic will increase 10 to 15% because of lower prices, helping to make up for declines in U.S. demand. Exports in the two previous years ran a bit less than 1 billion lb each.

Uses of low-density polyethylene in the U.S. long have been led by film, most of which goes into packaging of one kind or another. Film in packaging has become so widespread that polyethylene is becoming the mark against which competing materials are measured, much as paper was 25 years ago.

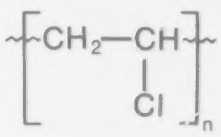
Into the all-important film domain now comes linear low-density polyethylene, which boasts significantly better strength. The initial effect, and one which continues apace, is downsizing film thickness without loss of strength. Downsizing seldom is directly proportional to the increase in film strength of linear low-density material because most films contain blends of linear low-density and conventional low-density polyethylene. The amount of downsizing also undoubtedly varies with the end use of the film. The net lower effect on sales for the two kinds of low-density polyethylene is difficult to estimate. Analysts estimate the dent between 10 and 30%.

Since production costs also are much lower for linear low-density polyethylene than for high-pressure-process material, the obvious result will be a continuing shakeout of old high-pressure process units. Some will be converted to linear low-density production, but others will be torn down.

The economy may have the final say on these capacity changes in low-density polyethylene. Given a mild recovery, it's possible that, despite the advantage of a hot new product form, low-density polyethylene might take as long as other thermoplastics to regain 1979 volume and start growing again—at least another year.

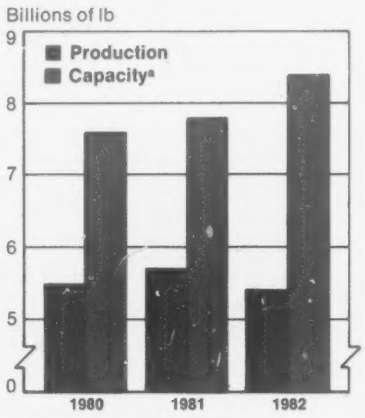
Key Polymers

Polyvinyl chloride



- ***Demand falling***
- ***Capacity in shakeout***
- ***Prices shattered***

PRODUCTION/CAPACITY



a First quarter.

HOW MADE

Polymerization of vinyl chloride by suspension, emulsion, solution, or bulk processes, sometimes using initiators

MAJOR FABRICATED FORMS (U.S.)

Extrusions, nearly two thirds in pipe, 60%; calendered sheet and film 10%; coatings 5%; moldings 5%

FOREIGN TRADE

Exports—rising to more than 550 million lb in 1982, imports—negligible

PRICES

List prices from 32 cents for large volume to more than 50 cents for specialty grades; discounts about 25% for large volume

COMMERCIAL VALUE

$1.3 billion for production, 1982

Polyvinyl chloride's toughness—created by the stabilizing effect of chlorine on the common hydrocarbon backbone of the molecule—also can be its greatest problem in economic periods like the present. As a result, PVC is a crippled product with nothing but rough sailing ahead. It will be too rough for a lot of producers in this crowded field, and already they have started to leave. Shakeout is the key word for this business in 1982 and 1983.

The resin's toughness can be a benefit in good years, but this property ties the polymer—unlike the consumer-oriented polyethylenes—to heavy-duty markets, most notably construction pipe. These markets are, in turn, part of the big-ticket durables' corner of the economy. This is the sector that suffers most in periods of high interest rates and recessions, when customers run out of money.

So PVC is in severe trouble, just after a prosperous time in the late 1970s that drew a lot of new investment and better technology into the business. In the 1980s, many analysts believe that big-company investors still can win in PVC, but smaller, older producers will drop out.

For 1982, not even the optimists foresee improvement from 1981's depressed production of 5.7 billion lb. The predicted range this year, from 5.2 billion to 5.5 billion lb, will be as much as 900 million lb below the peak of 6.1 billion lb in 1979.

Three years of production below the old high point, coupled with dollops of new plant capacity at several large producers, have led to a round of plant closings this year. Fierce downward pressure on prices this spring could have been the last straw after continued low rates of plant use. Overall capacity dropped 500 million lb per year in the second quarter alone. These shutdowns, expected to be permanent by many industry sources, involve small plants with capacities of less than 200 million lb per year. In the first quarter, other capacity also came down.

The specter of overcapacity was clear well before 1982. It already had led to delays or cancellation of new plants for both polymer and associated monomer. These decisions took out another billion lb of potential PVC capacity, which was due in 1982 and 1983.

As third-quarter 1982 began, annual nameplate capacity for PVC plants dropped below 8 billion lb per year, perhaps to 7.8 billion lb. Hence, if production this year totals about 5.4 billion lb, the current plant operating rate will be a feeble 69% of capacity.

This low rate helped put the pressure on prices this spring and summer. It didn't do polymer producers much good that raw material ethylene and chlorine prices also came down. Any savings went mainly to polymer customers. For producers, other costs continued to rise, tightening the overall cost-price squeeze and leading to plant shutdowns.

A small recovery in demand currently is under way, but price firming has been minimal even though summer shutdowns have ended at downstream fabricating plants. If anything, polymer prices have been weaker than earlier in the year despite vigorous levitating efforts by producers. A rising trend in monomer prices is just making matters worse for polymer producers.

One area actually aided by PVC's weak prices is exports. For the year, exports could be up 10 to 20% to more than 500 million lb. This gain would add up to 100 million lb to the production total.

Other PVC outlets don't have much going for them because of the depressed economy. The biggest single use, pipe, continues to be buffeted by the slump in construction. This slump has led to large inventories at the pipe product level that will not be worked down until there is some turnaround in the economy. Other construction uses such as siding, window frames, and flooring also have been hurt, and their growth prospects have been delayed for another year.

Until home construction and related uses of this polymer recover, PVC will continue its wrenching shakeout. Output will not climb back fully until well beyond 1983, and financial health will be very much in the distance. PVC's real-market price is below the ethylene price of 18 months ago, having dropped about 20% from its 1980–81 plateau. The resin's total market value this year of about $1.3 billion also will be down about 20% from 1981.

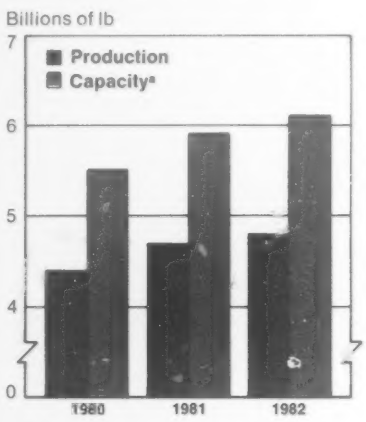
Key Polymers

High-density polyethylene

$$-\left[CH_2-CH_2\right]_n-$$

- ***Demand inching up***
- ***Capacity also up***
- ***Price discounts heavy***

PRODUCTION/CAPACITY



a First quarter.

HOW MADE

Polymerization of ethylene catalyzed by metallic salts and alkyls

MAJOR FABRICATED FORMS (U.S.)

Blow molding, mainly containers, 40%; injection molding 25%; pipe and conduit 10%; film 5%

FOREIGN TRADE

Exports—rising to more than 600 million lb in 1982, imports—less than 100 million lb

PRICES

List prices 45 to more than 50 cents per lb; discounting heavy

COMMERCIAL VALUE

$1.8 billion for production, 1982

Once again, high-density polyethylene provides a happier note or two in thermoplastics' sad song this year. It has the highest plant use rate of the five, at 79% of nameplate capacity, and actually is inching up in production on the strength of rising exports.

HDPE still has problems. Its price is roundly discounted, leading to a value drop from 1981. And some markets, such as pipe, are reeling in the recession.

Still, other markets, especially the big one in packaging, are fairly stable and could grow again. This plastic is the stiffer polyethylene best known in consumer containers such as milk bottles.

In 1982, production of high-density polyethylene probably will reach 4.8 billion lb, up about 100 million lb from 1981. Although this level won't match the record 5.0 billion lb in 1979, it still will set the resin apart as the only major thermoplastic to gain in production this year.

There are pessimists in the business who expect output to decline a bit in 1982, perhaps 100 million lb from 1981. But even with such a 2% drop, HDPE would do better than the other thermoplastics, whose declines will range from 5 to 11%.

Estimates of HDPE production may be less accurate than in the past because of the development of linear low-density polyethylene technology. Some high-density material can be made in the new linear low-density units. Such volume can slightly skew production estimates for both high- and low-density polyethylene.

However, industry sources guess that the amount of HDPE produced in linear low-density units will be quite small in 1982—as little as 100 million lb. Hence, analysts' range of total production estimates for high-density of 4.6 billion to 4.8 billion lb should be reasonably close.

Excluding the secondary high-density capacity in linear low-density plants, nameplate plant capacity for high-density polyethylene was 6.1 million lb in first-quarter 1982. Addition last year by Phillips Petroleum was offset by shutdown at Cities Service. Some expansions still are under way, but others have been halted. Net additions in 1982 will be small, adding very little to production.

The resulting plant operating rate of 79% of capacity will be nearly the same as in 1981 and 1980. So, as one source puts it, this polymer isn't doing badly relative to other plastics or organic chemicals in general. And high-density has been a much needed mainstay for the ethylene market.

Exports are HDPE's main boost this year, since U.S. demand is not pulling up. Propelled by bargain prices, exports are returning to more than 600 million lb in 1982 after slumping to about 450 million lb in 1981.

In the U.S., major uses are expected to vary no more than 5% up or down from volume in 1981. Containers, mainly bottles but also shopping bags, are the top market. Most containers with tight lids are blow-molded in a wide variety of shapes for a host of uses. Although capture of brand new markets seems mostly over, these outlets should continue to grow long-term at an above-average rate for this resin.

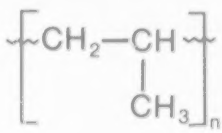
Injection-molded products from HDPE also have diverse shapes and uses. Nearly a third of these items by weight are containers with tight lids. Another sizable portion are auxiliaries such as cases for milk bottles. Growth in these areas has slowed because of relatively long product life, which makes replacement volume small. Other injection-molded products such as housewares and toys aren't likely to grow much, especially since competition is coming from polypropylene.

Pipe, tubing, and film account for many of the other uses of HDPE. Pipe has been hit by the slowdown in construction markets and by the poor agricultural economy, which is reducing expansion in end-use irrigation systems. Film used in shopping bags has had good growth but could run into strong competition from linear low-density polyethylene.

Largely because of its strength in such packaging uses, HDPE has escaped the financial nosedive hitting LDPE. High-density suffers price discounts, but its real-market price is down only a few cents a pound from 1981. Total value of high-density production is about $1.8 billion in 1982, down a bit from the peak of $1.9 billion in 1981.

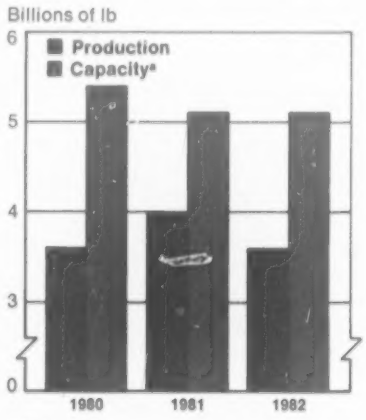
Key Polymers

Polypropylene



- ***Demand off***
- ***Capacity flat***
- ***Price discounts small***

PRODUCTION/CAPACITY



a First quarter.

HOW MADE

Polymerization of propylene catalyzed by metallic salts and alkyls

MAJOR FABRICATED FORMS (U.S.)

Injection molding 40%, fibers 35%, film 10%

FOREIGN TRADE

Exports—rising to 750 million lb in 1982, imports—negligible

PRICES

List prices 40 cents per lb for large volume; relatively small discounting

COMMERCIAL VALUE

$1.3 billion for production, 1982

Polypropylene has been eclipsed as the hotshot thermoplastic by the sensation from linear low-density polyethylene. But polypropylene still is the most versatile resin. It thrives on new market development and is the only one of the five largest-volume thermoplastics with a big stake in fibers. It also is proportionately the most international with 21% of U.S. output headed for export this year.

But polypropylene's diversity merely has exposed it to more recession-wracked markets this year, and volume will be down. Production in 1982 could be 3.6 billion lb, about the same in 1980 but down 10% from its record 4.0 billion lb in 1981.

The resin could do better than this. Some industry sources predict 3.8 billion lb production, citing substantially increased exports. They expect this important outlet to climb perhaps 100 million lb from 1981 to 750 million lb. They also foresee a recovery in automotive uses and continued growth in packaging, especially rigid forms.

Current polypropylene nameplate plant capacity totals about 5.1 billion lb per year. If production in 1982 reaches just 3.6 billion lb, the average plant operating rate will be 71% of capacity. For the higher production estimate, the operating rate would go to 75%.

Capacity appears at first to be stable because there have been no reports of expansion for well over a year. However, capacity still could be growing, since catalysts and other technology continue to improve. Although such additions are hard to divine and have varying success, some industry sources say they will be small this year, perhaps 50 million lb, owing to the profit squeeze.

Normally, less-than-robust business would appear to be an incentive to develop new products or improve existing ones to spur sales. Some of this undoubtedly is going on. But offsetting this is the conservatism of downstream fabricators. Faced with difficult times, including high inventory costs, they are reluctant to change to a new polymer that might perform differently from an older, more familiar material. So unfortunately, innovation can be rarer in these times than otherwise, says one polypropylene executive.

Competition among polymers hasn't hurt polypropylene very much even though it has a real selling price about 10 cents a pound higher than most low-density polyethylene and about equal to high-density polyethylene. Polypropylene's relative price rise is due to a corresponding rise in the relative cost of raw material propylene. After trailing ethylene by a few cents a pound in past years, propylene now leads by a few cents.

U.S. demand for polypropylene is down, mostly for the usual recessionary reasons. For example, use in the important transportation area is down because of the slump in car production. Use of polypropylene per vehicle probably is holding its own because of increased applications. However, downsizing in cars tends to reduce the size of an individual piece, and total auto output is way off. Similarly, appliance uses are down because production has fallen.

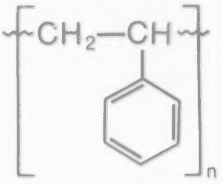
Fiber and filament uses have fallen because of the crunch in home building and home furnishings. Polypropylene volume in carpets and furniture is down about as much as in injection molding. High hopes for growth of fibers in apparel are yet to be realized. Fashion seems to have more influence in this than do the good physical properties of polypropylene fibers. Nonwoven products of polypropylene fibers have moved beyond the experimental stage but many of their developmental and performance questions still are unanswered.

Film, particularly the oriented types, has one of the better records this year among polypropylene markets. For example, its cost-performance characteristics have allowed it to replace cellophane in many packaging uses. Still, problems of heat sealing and oxygen penetration—not unsolvable but expensive to handle—tend to hold back growth. Nonoriented film continues to be offered, but future sales growth appears slow compared to its faster-moving cousin.

Despite this immense market spectrum, including many potential future growth areas, polypropylene has stalled in 1982. Although not in a tailspin like polyvinyl chloride, polypropylene needs a fresh expansion in the economy to reach the new records its vigorous developers expect.

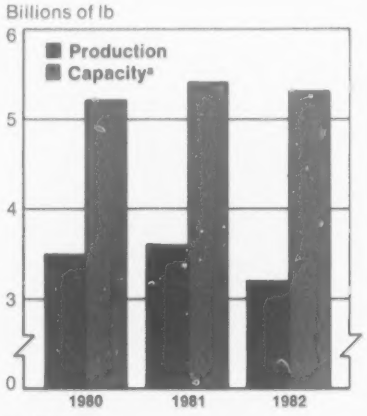
Key Polymers

Polystyrene



- ***Demand sliding***
- ***Capacity shaved***
- ***Price discounts heavy***

PRODUCTION/CAPACITY



[a] First quarter.

HOW MADE

Polymerization of styrene using a peroxide initiator

MAJOR FABRICATED FORMS (U.S.)

Injection molding 50%, extrusions 35%, expandable beads 10%; one third of end markets in packaging

FOREIGN TRADE

Exports—holding at about 125 million lb in 1982, imports—negligible

PRICES

List prices 45 cents per lb and up for large volume; discounting heavy

COMMERCIAL

$1.2 billion for production, 1982

The center of gloom for thermoplastics, as usual, is the main aromatic, polystyrene. At the top in price and the bottom in market performance in 1982, this resin can't seem to win. Even with some growth coming in a reinvigorated economy, polystyrene faces a hard haul over the next decade.

Although polystyrene has a big stake in packaging, as do the polyethylenes, it doesn't get the corresponding stability. The reason is that even in packaging, polystyrene, like polyvinyl chloride, is tied too much to expensive durables such as appliances, which slump in recessions. Further, polystyrene—unlike polypropylene—has no big export cushion to fall back on when U.S. business sours. To make matters worse, polystyrene slowly is losing markets to competing materials, especially polypropylene.

So polystyrene is staggering. The long recessionary period since 1979 has cut production fully 20%, and the resin may take much of this decade to climb back. Producers aren't waiting and have begun shutting down plants. Even at a reduced nameplate total of 5.3 billion lb per year, capacity use will run just 60% this year.

For 1982, analysts estimate production at 3.2 billion lb, down 11% from last year's 3.6 billion lb for the worst drop among major thermoplastics. Even if polystyrene resumes its long-term growth rate of 4 to 5% per year, it will take a long time to match 1979 production. If growth declines to 3% annually, a pace predicted by a growing number of industry sources, and another recession occurs later in the 1980s, it could be 1990 before polystyrene regains its old peak.

Behind the slow growth rate are the usual problems of an old material. With mostly mature markets and damage from competing materials, polystyrene suffers low profitability, which holds down money for new market development. A recession simply compounds the fundamental problem.

In packaging markets, the current recession has had a major impact. Since 1979, the cost of polystyrene continued to rise for a while despite producers' efforts to hold the line. The resulting higher prices through 1981 led some customers to switch away and discouraged prospective new customers. Property limitations curb switching somewhat, but the threat remains, and further development work in other polymers could hurt polystyrene even more.

In nonpackaging uses, competition from other polymers, especially polypropylene, also limits polystyrene's growth outlook. For example, housewares, toys, electronic and electrical appliances, and recreational articles are among important outlets threatened by other polymers. In these areas, polymer cost alone can be the critical factor, outweighing any long-run performance requirements. And in any case, many final products have acceptable life spans of just a few months or a year. So if polystyrene's price rises relative to other materials, polystyrene automatically is in trouble.

Competition of a different kind is pruning polystyrene exports. In 1982, analysts expect exports to decline to about 125 million lb from about 150 million lb in 1981. The problem is that technology is readily available for polymerizing styrene. This has led to construction of many small plants for regional markets around the world. U.S. exports of common polystyrene grades can't compete with foreign production when transportation costs are added in. Hence, much of U.S. polystyrene exports are expected to be specialty grades with relatively small volume.

There is one bright spot in polystyrene's future—expandable beads. Analysts predict that beads will grow from a tenth of total polystyrene production at present to one eighth in coming years. The attraction for beads is their insulating and shock absorbing properties. A familiar example is cups for coffee and other hot liquids, which will take 4% of total polystyrene output. Insulation board made of beads, now languishing because of the slump in construction markets, is expected to be another growth area, pulling up total polystyrene consumption over the long run.

Overall, for 1982 and 1983, polystyrene producers will be hard pressed just to hold down market losses. When economic recovery takes hold, part of polystyrene demand may bounce back, but some markets could be gone forever.

NOTE

ONLY THE FOLLOWING PAGES OF THIS

PUBLICATION HAVE BEEN FILMED

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